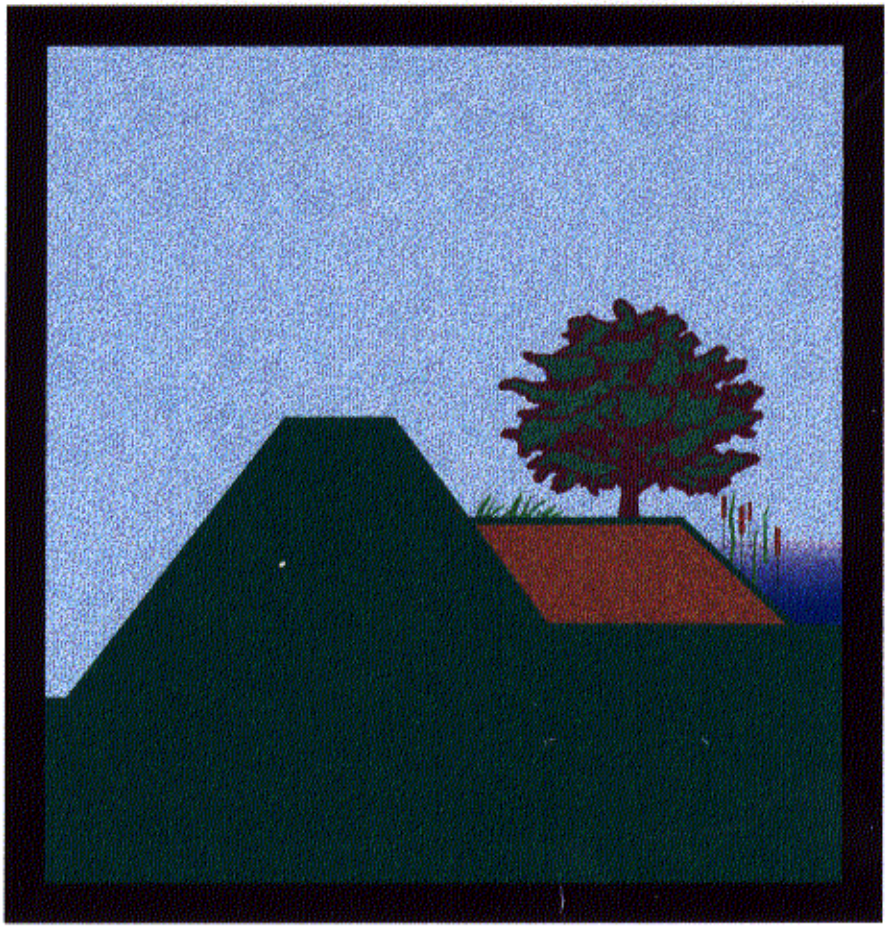
CALFED
BAY-DELTA
PROGRAM

Levee System Integrity Program Plan

Draft Programmatic EIS/EIR Technical Appendix

June 1999



Long-Term Levee Protection Plan
June 1999

Reduce the risk to land use and associated economic activities, water supply, infrastructure, and ecosystem from catastrophic breaching of Delta levees

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FOREWORD

The Delta Levee System Integrity Program, like all components of the CALFED Bay-Delta Program (Program), is being developed and evaluated at a programmatic level. The Program is currently in what is referred to as Phase II, in which the CALFED agencies are developing a Preferred Program Alternative that will be subject to a comprehensive programmatic environmental review. This report describes both the long-term programmatic actions that are assessed in the June 1999 Draft Programmatic EIS/EIR, as well as certain more specific actions that may be carried out during implementation of the Program. The programmatic actions in a long-term program of this scope necessarily are described generally and without detailed site-specific information. More detailed information will be analyzed as the Program is refined in its next phase.

Implementation of Phase III is expected to begin in 2000, after the Programmatic EIS/EIR is finalized and adopted. Because of the size and complexity of the alternatives, the Program likely will be implemented over a period of 20-30 years. Program actions will be refined as implementation proceeds, initially focusing on the first 7 years (Stage 1). Subsequent site-specific proposals that involve potentially significant environmental impacts will require site-specific environmental review that tiers off the Programmatic EIS/EIR. Some actions, such as levee rehabilitation, also will be subject to permit approval from regulatory agencies.

EXECUTIVE SUMMARY

This Long-Term Levee Protection Plan outlines a long-term strategy to reduce the risk to land use and associated economic activities, water supply, infrastructure, and ecosystem from catastrophic breaching of Delta levees. To achieve this and other CALFED objectives, in addition to meeting CALFED solution principles, Delta levees generally must remain in their current configuration.

The benefits of an improved Delta levee system include greater protection to Delta agricultural resources, municipalities, infrastructure, wildlife habitat, and water quality as well as navigation and conveyance benefits. The wide range of beneficiaries of the Delta Levee System Integrity Program (Levee Program) include Delta local agencies; landowners; farmers; boaters; wildlife; and operators of railroads, state highways, utilities, and water distribution facilities. Delta water users and exporters also benefit from increased protection to water quality. Federal interests benefit from improvements to conveyance, navigation, commerce, and the environment and from reduced flood damage.

This document formulates an effective strategy to achieve the Levee System Integrity Program objective and is indeed necessary to facilitate all CALFED objectives. The Long-Term Levee Protection Plan would be implemented over a 20- to 30-year period and cost approximately $1.5 billion (1998 dollars).

Recognizing these potential benefits, state and local agencies formed a partnership to reconstruct Delta levees. This effort has resulted in a steady improvement in the Delta levee system. The success of the Delta in the 1997 and 1998 flood events illustrates the value of approximately $100 million of improvements made with Senate Bill (SB) 34 funds and over $10 million in emergency Public Law (PL) 84-99 work performed by the U.S. Army Corps of Engineers (Corps). These funds, in addition to local funds, have resulted in over $160 million in improvements to Delta levees since the SB 34 program's inception in 1988.

Over the past 10 years, staff from the California Department of Water Resources (DWR), California Department of Fish and Game (DFG), and many local agencies have worked together to successfully implement the existing levee program under SB 34 and Assembly Bill (AB) 360. In addition to managing over $100 million in levee funds, SB 34 and AB 360 program staff have developed and implemented three supply depots in the Delta for quick deployment of emergency materials, developed and began implementation of 32,000 lineal feet of new wildlife habitat, advanced subsidence control including new levee designs and monitoring techniques, coordinated beneficial reuse of dredged material projects, and continued to advance solutions to the numerous complexities related to flood control and

habitat creation in the Delta's environmentally sensitive ecosystem. These efforts represent a positive first step in meeting the long-term CALFED objectives.

However, much more remains to be done, including:

- Improving levees to a higher standard,
- Developing adequate and reliable funding,
- Addressing permit and economic issues to enable expanded dredging and beneficial reuse of dredged material,
- Further improving existing emergency response capabilities,
- Reducing conflicts between levee maintenance and terrestrial and aquatic habitat resources on levees,
- Improving permit coordination,
- Incorporating subsidence control, and
- Continuing to quantify risks to levees and implementing appropriate risk management strategies.

CALFED provides a unique opportunity for federal, state, and local agencies to jointly address these needs. Existing Delta levee system problems and solution strategies proposed by CALFED are outlined below.

Many Delta levees do not provide a level of flood protection commensurate with the high value of beneficial uses they protect. As mandated by the California State Legislature and adopted by CALFED, the physical characteristics of the Delta should be preserved essentially in their present form. This is necessary to protect the beneficial uses of the Delta. The key to preserving the Delta's physical characteristics and to achieving CALFED's objectives is the levee system. Over the next 20-30 years, CALFED will invest billions of dollars in the Delta. The levees must protect this investment.

The existing levee program was intended to improve Delta levees up to the California/ Federal Emergency Management Agency (FEMA) Hazard Mitigation Plan (HMP) standard. As of January 1998, 36 of 62 (58%) Delta islands and tracts were in compliance with the HMP standard. This has resulted in a significant improvement in the ability to protect the beneficial uses of the Delta. However, as CALFED invests in the Delta, more is at risk. Therefore, CALFED has chosen to improve Delta levees to a higher level.

The CALFED Levee Program will institute a program that is cost-shared among the beneficial users, to reconstruct Delta levees to the Corps' PL 84-99 Delta Specific Standard. This action will increase levee reliability and reduce emergency repair costs. In addition, levee districts meeting this levee standard are eligible for federal emergency assistance under PL 84-99.

The CALFED Levee Program also will continue the existing Special Flood Control Projects effort to provide additional flood protection for key Delta levees that protect public benefits of statewide significance.

Funding for levee work is insufficient, inconsistent, and often delayed. Under the existing State levee programs, local agencies finance projects in anticipation of reimbursements. The Delta Levees Maintenance Subventions Program (Subventions Program) annually distributes available state funds on an equal basis to all participants as approved by The Reclamation Board. Each fiscal year, districts are notified of the available funding but cannot be sure what their final reimbursement will be until all claims are received and processed. The Delta Levees Special Project Program (Special Projects Program) receives applications and enters into agreements with participants to fund specific projects. Projects eligible for funding must be in accordance with priorities approved by the California Water Commission. Once projects are deemed eligible, agreements are executed and districts can receive payments as work progresses. The lack of adequate and consistent appropriations in the Subventions and Special Projects Programs poses a challenge for local agencies to complete planned rehabilitation projects.

Many districts have experienced difficulty in rebounding from the long-term financial debt that was incurred while they waited for resolution of the 1980-1986 state and federal disaster assistance claims. The more recent 1995, 1997, and 1998 floods also have strained local financial resources. The overall financial health of these districts have significantly affected their ability to maintain their levee systems and limited their ability to upgrade their levees to a long-term levee standard. The Levee Program will secure federal cost sharing for Levee Program actions. The Corps' "Sacramento-San Joaquin Delta Special Study" could be used to establish a federal authority and subsequent federal funding. The Levee Program will establish consistent adequate funding for the Subventions and Special Projects Programs that will enable districts to plan and finance their work with greater certainty of reimbursement.

Dredging to increase channel capacity and to provide material for levee reconstruction, habitat restoration and creation, and subsidence control has been curtailed due to regulatory constraints, causing dredging equipment and trained manpower to leave the Delta. Regulatory agencies limit dredging in the Delta due to water quality and endangered species concerns. The dredged material can be relocated to suitable habitat development sites such as in-channel islands, waterside berms, or on-island areas, configured with different topographic features, and planted with selected vegetation to produce and/or improve diverse habitat types. Because insufficient data are available to quantify impacts and establish acceptable dredging criteria, the agencies regulate dredging activities more conservatively. Lack of a General Order for Waste Discharge Requirements (WDRs) complicates the permitting process.

CALFED will work with the Regional Water Quality Control Board (RWQCB) and the Corps to develop a Regional Dredged Material Management Plan and General Order for WDRs.

Existing emergency response capabilities need to be continuously refined and funding increased. The existing emergency response system has significantly improved over the past several years. The State Office of Emergency Services (OES) continues to work with other emergency response organizations, including DWR, local Delta agencies, counties, FEMA, and the Corps to improve the emergency response system. However, the system is limited by insufficient dedicated Delta funding. Command and control procedures also need to be continuously refined using adaptive management principles.

CALFED plans to build on the existing emergency response system. CALFED's Emergency Response Subteam determined that an effective Delta levee emergency response program should be concentrated in seven areas:

- Funding;
- Response by state and federal agencies;
- Availability of flood fight resources;
- Integrated response;
- Clarification of regulatory procedures;
- Clarification of program eligibility, inspection, documentation, auditing, and reimbursement procedures; and
- Dispute resolution.

Levee reconstruction and maintenance sometimes conflicts with management of terrestrial and aquatic habitat resources on or around levees. In general, vegetation on levees results in more difficult levee maintenance. Stakeholders have voiced concern that activities to control levee and channel vegetation are often delayed because of potential impacts on endangered species habitat. Because levee districts often keep vegetation off of levee slopes to avoid the need to contend with endangered species requirements, potential opportunities for quality habitat are lost. Better strategies are needed to allow quality habitat to flourish on or around levees without hampering levee maintenance and construction.

CALFED will coordinate with state and local agencies to develop updated environmental baseline values. When reconstructing levees, mitigation and enhancement of existing habitat must be relocated outside the minimum section required for levee integrity (structural cross section) when possible. CALFED will work to establish a conservation strategy that encourages levee managers to allow critical habitat to grow on levees while giving assurances that levee managers will be able to maintain their levees.

Obtaining permits for levee work can be difficult and time consuming. Historically, obtaining permits for levee work has been difficult. In 1996, the California Department of Fish and Game (DFG) assumed a more active role in assisting levee districts with the regulatory process. This participation is a significant improvement and should continue. However, other regulatory agencies often lack sufficient resources to issue permits without delays. In addition, disagreements often exist between regulatory agencies with overlapping jurisdiction. A more efficient permit coordination process is needed.

To ensure successful implementation of all CALFED programs, a coordinated permit process will be established. The process will anticipate the numerous permit requirements for actions approved as part of CALFED. Coordinated permitting will not relax permitting requirements but will include information sharing among regulatory agencies to coordinate the permitting process. The permit coordination process also would be designed to address broad issues in order to improve the efficiency of such processes as general and regional permits, mitigation banks, and habitat improvement areas.

Subsidence of portions of some Delta islands threatens levee integrity. Subsidence near some levees in the Delta may adversely affect levee integrity. The Subsidence Subteam considers that subsidence can be corrected and levee integrity assured. However, a grant program is recommended to develop new methods that are more effective and less intrusive to current land use.

Seismic loading threatens Delta levees. Some CALFED stakeholders are concerned that earthquakes may pose a catastrophic threat to Delta levees, that seismic forces could cause multiple levee failures in a short time, and that such a catastrophe could overwhelm the current emergency response system.

CALFED agrees that earthquakes pose a potential threat. In addition, Delta levees are at risk from floods, seepage, subsidence, and other threats. To address this concern, CALFED has begun a risk assessment to quantify these risks and develop a risk management strategy.

Over the past year, the Seismic Risk Assessment Subteam quantified the seismic risk to Delta levees. The results indicate that "Significant seismic risk is present; however, improved preparedness can reduce the potential damage." CALFED is continuing its risk assessment of floods, seepage, subsidence, and other threats.

Several risk management options have been developed for inclusion in the CALFED Preferred Program Alternative. The available risk management options include, but are not limited to:

- Improving emergency response capabilities,
- Reducing the fragility of the levees,
- Improving through-Delta conveyance,
- Constructing an isolated facility,
- Developing storage south of the Delta,
- Releasing more water stored north of the Delta,
- Restoring tidal wetlands,
- Controlling and reversing island subsidence,
- Curtailing Delta diversions, and
- Continuing to monitor and analyze total risk.

The final Risk Management Plan may include a combination of these options.

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ACKNOWLEDGMENTS

CALFED staff sincerely appreciates the participation and significant contributions of all agency and stakeholders involved with the Levee System Integrity Program.

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GLOSSARY

The following terms are used in describing the Delta Levee System Integrity Program:

Action. A physical, operational, legal, or institutional change intended to maintain or achieve a desirable condition (target) of the Delta levee system.

Boil. A seepage exit point on the landside of the levee that is characterized by the rapid movement (boiling) of sand particles.

Channel islands. Small, unleveed land masses in Delta channels that typically provide quality wildlife habitat. Some islands are remnants of original Delta marsh lands, and others are the result of channel widening, levee construction, and dredged material disposal.

CMARP. Comprehensive Monitoring, Assessment, and Research Program.

Cut-off wall. An impermeable barrier constructed through the levee to interrupt (cut off) seepage through the levee or foundation. A slurry cut-off wall is a combination of soil, cement, and bentonite (a clay material) constructed inside a trench down the center of the levee. This trench must be sufficiently deep to cut off or reduce seepage through or under the levee.

Delta. The Sacramento-San Joaquin Delta as described in the California Water Code Section 12220.

Delta islands. Islands in the Sacramento-San Joaquin Delta protected by levees. The surface of the majority of islands are below sea level and provide many benefits, including agriculture, recreation, water quality, and habitat for fish and wildlife.

Drainage blanket. A layer of crushed or rounded gravel and coarse sand, usually encapsulated in a geotextile filter fabric, that is placed on the slope and landside toe of a levee to control seepage and piping. Drainage blankets usually are placed prior to the addition of a stability berm.

Erosion. Loss of levee material due to the effects of channel flows, tidal action, boat wakes, and wind-generated waves.

Ecosystem Restoration Program Plan. A comprehensive plan for restoration and management of the Bay-Delta ecosystem, including upstream tributaries and watersheds.

Freeboard. The vertical distance between the levee crest and the design water surface elevation.

Hydrostatic pressure. The pressure of water at a given depth resulting from the weight of the water above it.

Implementation objective. A description of what the program will strive to maintain or achieve for the Delta levee system that is not intended to change over the life of the program.

GLOSSARY (CONTINUED)

Levee crown. The highest, near-horizontal part of the levee between the water and landside slopes. The levee crest.

Liquefaction. A condition in which saturated silty sands or sandy silts have no shear strength. Liquefaction occurs often when loose soils are subjected to ground shaking during an earthquake.

Local agency. Any city, county, local agency, or other political subdivision of the state that is authorized to maintain project or non-project levees.

Non-project levee. A local flood control levee in the Delta that is not a project facility under the State Water Resources Law of 1945, as shown on page 38 of DWR's "Sacramento-San Joaquin Delta Atlas," dated 1993. (See Figure 3.)

Oxidation. The conversion of organic matter (such as peat) by bacteria to carbon dioxide. The conversion is directly related to aerobic soil bacteria.

Piping. Erosion of levee or foundation material at seepage exit points. The process carries away levee material, resulting in shorter seepage paths and accelerated internal erosion of the levee.

Primary zone. The Delta land and water area of primary state concern and statewide significance that is situated within the boundaries of the Delta but not within the urban limit line or sphere of influence line of any government's general plan or currently existing studies, as of January 1, 1992 (Delta Protection Act of 1992).

Project levee. A federal flood control levee, as shown on page 40 of DWR's "Sacramento-San Joaquin Delta Atlas," dated 1993, that is a project facility under the State Water Resources Law of 1945—if not less than a majority of the acreage under the jurisdiction of the local agency that maintains the levee is within the Primary zone of the Delta, as defined in the Public Resources Code (and above). (See Figure 2.)

Seepage. The movement of water through a porous material in response to a hydraulic gradient.

Seismicity. The frequency, intensity, and distribution of earthquake activity in an area.

Setback levee. A constructed embankment that is positioned some distance from the edge of the river or channel to prevent flooding and is not in contact with the original levee. Setback levees provide area for wildlife habitat to develop and for floodflow capacity.

Settlement. A downward movement of a surface as a result of underlying soil compression or consolidation caused by an increased load or the loss of underlying soil (foundation) support.

Slope protection. Various types of materials used to protect the levee surface and stream bank adjacent to the levee from erosion.

Stability berm. Earth fill usually placed against the levee landside slopes to act as a counterweight to prevent rotational slides.

Structural section. The minimum levee cross section required for levee integrity.

Subsidence. A decrease in ground surface elevation. Subsidence in the Delta is the result of a complex interaction of deep or large-scale processes and numerous shallow, near-surface causes. Subsidence is discussed in terms of levee subsidence or settlement and interior island subsidence.

Suisun Marsh islands. Islands in the Suisun Marsh protected by levees. The surface of the majority of islands are below sea level and provide many benefits, including recreation uses and habitat for fish and wildlife.

Target. A qualitative or quantitative statement of an implementation objective. Targets may vary as new information becomes available and according to Delta conveyance alternatives. Targets are to be set based on realistic expectations; must be balanced against other resource needs; and must be reasonable, affordable, cost effective, and practicably achievable.

Toe ditch. The open trench along the landside toe of the levee typically used to collect seepage water and distribute the water for agricultural purposes.

Toe drain. A trench along the landside toe of the levee designed to reduce saturation of the levee, control seepage, and help prevent boils. A toe drain is constructed by placing crushed rock in a trench at the landside toe of the levee. The rock is encapsulated in filter fabric that prevents levee and foundation soils from migrating into the rock.

LIST OF ACRONYMS

AB	Assembly Bill
Bay	San Francisco Bay
Base Levee Protection	Delta Levee Base Level Protection
BMPs	best management practices
Board	State Reclamation Board
CALFED	CALFED Bay-Delta Program
CMARP	Comprehensive Monitoring, Assessment, and Research Program
Corps	U.S. Army Corps of Engineers
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin legal Delta
DFG	California Department of Fish and Game
DWR	California Department of Water Resources
EIS/EIR	Environmental Impact Statement/ Environmental Impact Report
Emergency Management Plan	Delta Levee Emergency Management and Response Plan
EOS	earth observation system
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Act
GIS	geographic information system
GPS	global position system
HMP	Hazard Mitigation Plan
LERRDs	lands, easements, rights of way, relocations, and disposal areas
Levee Program	Delta Levee System Integrity Program
LIG	Levee Implementation Group
LTMS	Long-Term Management Strategy
MOU	memorandum of understanding
OES	Office of Emergency Services
PL	Public Law
RWQCB	Regional Water Quality Control Board
SEMS	Standardized Emergency Management System
SB	Senate Bill
Special Projects	Special Delta Flood Protection Projects

LIST OF ACRONYMS (CONTINUED)

SRCD	Suisun Resource Conservation District
Subsidence Control	Delta Levee Subsidence Control Plan
Subventions Program	Delta Levee Maintenance Subventions Program
SWP	State Water Project
WDRs	Waste Discharge Requirements
ZOI	zone of influence

WHAT'S NEW IN THE LONG-TERM LEVEE PROTECTION PLAN?

The Long-Term Levee Protection Plan continues to be improved in response to comments, studies, and research. The plan is being developed with the same Objectives, Mission, and Vision as originally established and presented in the March 1998 draft. However, much is different in this draft. The report has been reorganized. Descriptions of the Levee System Integrity Program (Levee Program) elements have been expanded. Discussions of Ecosystem Restoration Program and Levee Program coordination, linkages with other CALFED programs, and implementation have been expanded. Sections have been added on "Sea-Level Rise," "Permit Coordination," "Adaptive Management," "Monitoring and Research," "Funding," and "Stakeholder/Science Review." CALFED has added the Suisun Marsh levee system to the Levee Program as an optional strategy to achieve its objectives. Efforts to clarify linkages of these actions to the objectives is ongoing. A section titled "Suisun Marsh Levee System" has been added.

In addition, a detailed base level protection plan cost estimate has been prepared by engineers who are knowledgeable of Delta conditions; a summary of the cost estimate is included as an appendix. The Subsidence Control element has been revised to reflect an emphasis on whole island subsidence and subsidence as it affects levee integrity. The Emergency Response Subteam has prepared a draft emergency response report that also is included as an appendix. The Seismic Risk Assessment element has been revised to reflect the recently completed report from the Seismic Subteam, titled "Seismic Vulnerability of the Sacramento-San Joaquin Delta Levees."

A consolidated response to comments received during the public review of the Draft Programmatic Environmental Impact Statement/Report is included.

CONSOLIDATED RESPONSES TO COMMENTS ON THE 3/16/1998 DRAFT PROGRAMMATIC EIS/EIR

Public comment on the Draft Programmatic Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) resulted in receiving approximately 110 comments concerning the Levee System Integrity Program in 47 different comment letters. Draft responses to all the comments have been prepared, and these individual comment responses will be provided in a separate document. The most prevalent comments were sorted, and consolidated responses are provided in the interim. The most comments, 35%, concerned impacts on flood control and hydraulic mitigation. The top six topics, accounting for 80% of the comments, include flood control, levee-ecosystem coordination, levee maintenance, land use impacts, setback levees, and subsidence. The responses are presented below roughly in order, based on topic frequency.

Impacts on Flood Control and Hydraulic Mitigation

CALFED is considering flood control issues in its decisions. Multiple flood control benefits would be generated in the Delta from CALFED actions such as levee improvements, channel capacity improvements, and improved emergency response capability.

One Levee Program goal is to rehabilitate all Delta levees to the U.S. Army Corps of Engineers' (Corps') Public Law (PL) 84-99 Delta Specific Standard. However, this could cause hydraulic impacts upstream and downstream of the Delta.

To address these hydraulic impacts, CALFED is coordinating with the Corps and the State Reclamation Board (Board) in their efforts on the Sacramento-San Joaquin River Basins Comprehensive Flood Control Study that is currently underway. The study area includes major tributaries into the Delta. The CALFED Program and planning efforts will be compatible with the comprehensive study.

In addition, to address other in-Delta flood control impacts due to Delta levee improvements, CALFED is proposing north and south Delta flood control improvements.

CALFED recognizes the importance of coordinating Ecosystem Restoration Program, Levee Program, and Storage and Conveyance actions to avoid unnecessary adverse impacts. The respective program managers are coordinating their actions.

CALFED Program Coordination

The Base Level Protection element of the Levee Program specifies that all Delta levees will be rehabilitated and maintained to at least the Corps' PL 84-99 Delta Specific Standard. The Levee Program assumes that the Delta must remain generally in its current configuration if CALFED is to achieve its objectives for water quality, water supply reliability, ecosystem restoration, and levee system integrity. This assumption is based on California Water Code §12981, which states that "... the physical characteristics of the Delta should be preserved essentially in their present form...."

CALFED recognizes the importance of coordinating Ecosystem Restoration Program and Levee Program actions to avoid unnecessary adverse impacts. The respective Program Managers are coordinating their actions as needed. The results of this coordination will be included in the Long-Term Levee Protection Plan, Ecosystem Restoration Program, and the Conservation Strategy. Prospective designs for Ecosystem Restoration Program/Levee Program coordination will be presented. Specific locations for their implementation will be addressed in subsequent environmental documents for individual projects.

The Levee Program will balance the management of environmental usage with the protection of area landowners. Levee and habitat integration concepts continually are being reviewed and revised to develop designs that will permit the levee flood control system to be operated and maintained without compromising levee integrity or harming the environment.

The Long-Term Levee Protection Plan includes a section on Ecosystem Restoration Program/Levee Program Coordination that explains the importance of Assembly Bill (AB) 360 and other statutes in ensuring that levee maintenance and reconstruction work do not conflict with ecosystem goals. The Levee Program also recognizes that an effective emergency response capability is essential to any levee program.

Levee Standards and Maintenance

CALFED concurs that the rehabilitation of the Delta levee system must be an integral part of the selected preferred alternative. A basic tenet is that the Delta should generally remain in its current configuration if CALFED is to achieve its objectives. Moreover, any attempt to substantially change the current configuration would be viewed as non-implementable and therefore would not meet CALFED's solution principles. The Levee Program is one of the six common programs that would be implemented regardless of the selected preferred alternative.

Levee Program goals include obtaining sufficient reliable funding to rehabilitate and maintain all levees to the Corps' PL 84-99 Delta Specific Standard. The plan is to increase protection for islands by raising and strengthening levees and controlling subsidence, while shifting environmental enhancement responsibilities and coordination to the Ecosystem Restoration Program.

The Levee Program includes a Base Level Protection Element and a Special Improvement Projects Element. The Levee Program will build on existing levee programs identified in the California Water Code, such as the Delta Levee Subventions and Special Projects Programs that were modified by AB 360. The Levee Program will be consistent with the mandates of AB 360. Under the existing levee programs, local agencies prioritize Base Level Protection projects based on their individual needs. The California Water Commission approves Special Projects. CALFED plans to continue this successful approach, as will be specified in the CALFED Implementation Strategy.

The Levee Program seeks a mechanism to provide ongoing and reliable funding. Maintenance of the Delta levees benefits the general population of California, not only the individuals who live and work in the Delta. Accordingly, the Levee Program intends to finance levee improvements by balancing local funds with state and federal funds. In those areas covered by the Delta Levee Program, local agencies will continue to maintain their levees at their cost up to a certain limit.

Impacts on Land Use

History is the best evaluation of the sustainability of Delta levees. The current Delta Levee Subventions Program has demonstrated the long-term sustainability of the Delta and that the existing levee system can be stabilized and perform reasonably well. Over the past 10 years (1988-1998) the Delta has, with few exceptions, satisfactorily passed extremely high flood flows coupled with very low barometric pressures and high winds. Compared to the previous 10 years (1978-1988), where nearly two dozen levee breaks were observed, a trend showing significant progress emerges. CALFED's intention is to continuously improve on this successful approach.

Land acquisition needed to improve levee integrity would be minimal. The small investment in land would significantly increase the value of the land by increasing its level of flood protection, thereby justifying the small increase in benefit assessment necessary to provide operations and maintenance by the local agencies. CALFED intends to pursue easements, not fee title, whenever possible. CALFED is exploring ways to allow landowners to use the easements for access roads and equipment staging areas.

All levees that would be affected under the Base Level Protection Plan, which is the largest element of the Levee Program, would be listed in the Long-Term Levee Protection Plan. The actions of the Special Improvement Projects Program are subject to periodic analysis for statewide need and therefore are difficult to predict. Actions include general levee improvement, seismic retrofitting, and subsidence correction. The Levee Program currently has no plans to replace or move any levees.

In order to develop a comprehensive Bay-Delta solution that meets the six solution principles, conversion of private land for ecosystem restoration must be based on willing sellers and must be coordinated with the Delta Protection Commission. Because land for ecosystem restoration would be acquired only from willing sellers, there is no "trade off" between ecosystem restoration and levee maintenance. CALFED will determine what property is available from willing sellers and make choices based on their respective environmental values.

CALFED solutions should result in no significant redirected impacts. Seepage from newly created wetlands would be controlled as needed to prevent negative impacts on adjacent land use and adjacent islands. Land acquisition for Ecosystem Restoration could significantly affect benefit assessments. If the number of taxable acres is reduced to a point where operation of a reclamation district is no longer viable, this impact would be mitigated.

CALFED is pursuing opportunities to convert whole islands or large parcels to high-quality habitat. CALFED will **first** pursue converting public land and then acquiring private land from willing sellers. CALFED is working with the Delta Protection Commission, Delta landowners, and the Natural Heritage Institute to prepare a list of sites that include public and private land. After a comprehensive list of available land has been prepared, a cost/benefit analysis, as discussed in the Phase I Final Documentation Report, will be used to identify the best sites.

Setback Levees

CALFED does not propose the construction of setback levees as a means to improve levee system integrity or reliability. However, levee centerline alignments may move slightly landward to accommodate levee rehabilitation to the PL 84-99 Delta Specific Standard. Setback levees may be pursued to achieve Ecosystem Restoration and Storage and Conveyance benefits.

CALFED is concerned about the impacts associated with the development of setback levees. The merits and liabilities of setting back levees will be closely scrutinized. Constructing and maintaining setback levees on Delta soils containing large amounts of peat can be difficult and very costly. Therefore, use of setback levees may not be feasible in many cases.

The Levee Program objective is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. Improvements to levees outside the legal Delta are beyond the scope of this objective. However, the Levee Program is coordinating with the Corps and the Board in their efforts on the Sacramento-San Joaquin River Basins Comprehensive Flood Control Study that currently is under way. The comprehensive study may be a more appropriate venue to address improvements to levees outside the legal Delta.

Funding

The Levee Program goals include obtaining sufficient reliable funding to maintain and rehabilitate all levees to the Corps PL 84-99 Delta Specific Standard. Local agencies will continue to maintain levees at their costs (up to $1,000 per levee mile). CALFED is proposing to increase annual funding.

The varied and diverse benefits of the Levee Program are difficult to put a price on. However, CALFED has determined that the work is a necessary step in the implementation of any Delta solution.

CALFED concurs that an "ability to pay" assessment is needed, similar to DWR's existing Special Projects Program.

Subsidence

The Delta must stay basically in its current configuration if CALFED is to achieve its objectives for water quality, ecosystem restoration, and levee integrity. The benefits of maintaining Delta levees are far greater than the value of the privately owned land they protect. Moreover, any attempt to substantially change the levee system would be viewed as non-implementable and therefore would not meet CALFED's solution principles. Over the past 25 years, the existing levee program has demonstrated that levees in the Delta can be stabilized.

CALFED agrees that restoring elevations of subsided Delta islands would reduce the long-term vulnerability of the Delta system. In most cases, however, subsidence **reversal** is not implementable—due to excessive costs, right-of-way acquisition, land use conversion, and

political concerns. CALFED's currently planned Levee Program implementation actions will address subsidence to improve levee integrity.

Subsidence poses a threat to only a portion of the Delta levee system. The Levee Program is addressing subsidence within the levee integrity zone of influence. The Long-Term Levee Protection Plan will identify those areas at risk and will address subsidence as it affects levee stability. Existing geotechnical engineering practices can be applied to safely and economically rehabilitate and maintain existing levees.

Ecosystem Restoration Program actions would prevent or minimize subsidence at some interior island locations. The Water Quality Program is addressing subsidence control as it affects water quality. Efforts to control subsidence would be fully coordinated, and progress in subsidence control and management would be monitored through CALFED's comprehensive monitoring, assessment, and research program (CMARP).

CALFED is very interested in developing subsidence control measures (such as no-till farming) that minimize impacts on the current land use. The Subsidence Control Element of the Levee Program is proposing to establish a grant program to encourage the development of best management practices for controlling subsidence.

Controlling subsidence in the peat zones of the Delta by creating and flooding 20-acre habitat stewardships could be effective on some public lands but is considered impractical for private land. Permanently flooding lands nearly stops subsidence; however, in most cases, radically changes the land use.

Seismic Risk

The Levee Program convened an expert seismic/geotechnical engineering team to investigate the seismic risk to Delta levees. The preliminary results indicate that "significant seismic risk is present; however, improved preparedness can reduce the potential damage." The team's report is included in Appendix G and quantifies estimates of levee vulnerability. A seismic risk management strategy will be developed to address levee failures from seismic loading.

Dredging

CALFED acknowledges that the Levee Program and Ecosystem Restoration Program could benefit from clean dredged material, and that the Storage and Conveyance Program could benefit from dredging Delta channels to increase flow capacity. However, over the past decade it has become increasingly difficult to dredge in the Delta because of work windows to satisfy endangered species requirements and Central Valley Regional Water Quality Control Board (CVRWQCB) waste discharge concerns. CALFED is working with the CVRWQCB to establish waste discharge requirements and obtain general order permits that would allow dredging and reuse of non-saline dredged material. Presently, the use of saline dredged material in the Delta seems a remote possibility.

CALFED's need to dredge and reuse the material is clear. CALFED further agrees that potential partnership opportunities exist with bay dredgers. The Levee Program has been communicating with the Long-Term Management Strategy (LTMS) Program to identify

areas where coordination between the programs would be beneficial. Linkages between the Levee Program and the LTMS Program will be discussed in the revised Draft Programmatic EIS/EIR. The availability of needed borrow or dredged material is being investigated on a programmatic level. Implementation will be analyzed on a project-specific level.

Emergency Response

The Delta Emergency Management Plan is a component of the Long-Term Levee Protection Plan. The plan builds on existing emergency management systems, identifies pre-emergency measures and post-disaster recovery measures, and enhances integration of local and regional emergency management agency actions to protect Delta resources in the event of a disaster. Local agencies are acknowledged as first in line to address disaster events. The plan focuses on local agency preparation, coordination, and responsibility to provide enhanced initial response efforts to prevent damages and to provide recovery measures. Emergency response measures will be increased as a part of an overall Risk Management Strategy.

Permit Coordination

CALFED agrees that the existing multi-layered regulatory process must be simplified and coordinated. Toward this end, CALFED is developing a Permit Coordination Program. This program will stress information sharing among permitting agencies to create a more efficient process. The program also will address broad issues to improve the efficiency of permitting, such as general and regional permits and mitigation banks. Regular meetings of senior-level staff from all regulatory agencies is an integral component of the program to coordinate permits. Levee Program permit coordination issues will be addressed under the umbrella of the CALFED Permit Coordination Program.

Total Risk Assessment

There is a need to determine the total risk to Delta levees. An evaluation of seismic vulnerability has been completed; and steps are being taken to evaluate the aggregate risk, of which the seismic vulnerability is a contributor. Until the aggregate risk is quantified, it is difficult to compare the existing risks to the alternatives. Nonetheless, CALFED proposes to deal with the risk through a Risk Management Strategy that is not limited to Levee Program actions. CALFED will quantify the risk to system integrity and outline a risk management strategy. The goal of the strategy is not necessarily to guarantee system integrity but to provide the capability to quickly recover.

Boat Wakes

The Levee Program recognizes the contribution of boating wakes to erosion of levees. The relative impact depends on the size or energy of the wake, the levee's level of erosion protection, and the levee's exposure to wind-driven wave attack. Rehabilitation of levees

to the PL 84-99 Delta Specific Standard should provide increased protection against the effects of boating wakes on levees. In addition, efforts to coordinate levee improvements with habitat improvements may provide improved levee integrity.